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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/432,112 | 11/02/1999 | TAKASHI TSUDA | 837.1212/JDH | 9637 |

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2872

DATE MAILED: 11/25/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|-----------------|------------------------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 09/432,112 | TSUDA ET AL. <i>[Signature]</i> |
| | Examiner | Art Unit |
| | John Juba | 2872 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 09-25-02.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-8, 15, 16 and 20-62 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) 1-4, 15, 16, 25-28, 33-35, 47, 54, 59 and 60 is/are allowed.

6) Claim(s) 5-8, 20-24, 29-32, 36-46, 48-53, 55-58, 61, and 62 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

| | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 48 and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Delavaux, et al. [The rejection stands as set forth in the last Office action (paper # 15), and is repeated here, only for convenience.]

Referring to Figure 4 and the associated text, Delavaux, et al disclose a plurality of predetermined segment lengths in combination with optical amplifiers and a dispersion compensator providing a dispersion selected from a plurality of stepwise varying dispersions, which compensator is disclosed as locatable between pre- and post-amplifiers (Col. 4, lines 57 – 63). In Figure 4, the pre- and post-amplifiers are illustrated as a single unit, the connection of the dispersion compensator between these elements is best seen in Figure 3. Although Delavaux, et al expressly identify component 5 as a pre-amplifier and component 7 as an “amplifier” (Col. 2, lines 57 – 59), it will be appreciated that component 7 is a “post-amplifier” by virtue of its arrangement after the pre-amplifier.

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Claims 48 and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishikawa, et al (U.S. Patent number 5,602,666). [The rejection stands as set forth in the last Office action (paper # 15), and is repeated here, only for convenience.]

Referring to Figures 41, 42, and the associated text beginning in Column 41, Ishikawa, et al disclose a dispersion compensator providing a dispersion selected from a plurality of stepwise varying dispersions. Insofar as the channel dispersion is a function of length, the dispersions are inherently determined according to the length of the connecting fibers, and thus to the range of lengths. Ishikawa, et al disclose that a variable dispersion compensator (32) is "associated with" the intervening repeaters. Although elements (22) are identified as "repeaters", Ishikawa, et al disclose that a pair of optical amplifiers are located at preceding and subsequent stages of the compensators (claim 7 of the reference), as exemplified in Figure 39. Figure 39 is a "dispersion compensator package" and comprises a "dispersion compensating unit" between pre- and post-amplifiers. The physical components of one embodiment are shown in Figure 40. The embodiment relied upon in the rejection is not illustrated, but rather is the embodiment employing the "dispersion compensator unit" (32) of Figure 41, in place of the "dispersion compensator unit" (25) of Figure 40.

Claims 5 - 8, 20 - 24, 29-32, 36 – 46, 49 - 52, 55 – 58, 61, and 62, are rejected under 35 U.S.C. 102(b) as being anticipated by Chraplyvy, et al. [The rejection stands as set forth in the last Office action (paper # 15), and is repeated here, only for convenience.]

Referring *for example*, to Figures 1 and 2 and the associated text, Chraplyvy, et al disclose an optical system comprising a transmitter, a receiver, a plurality of optical fiber segments and at least one amplifier among the segments. Notably, Chraplyvy, et al anticipate an embodiment in which a dispersion shifted fiber segment is included among the segments (Col. 7, lines 15-17). Chraplyvy, et al further discloses a plurality of dispersion compensators (spooled DCF) (4), (13), (15), (8), (30), (28), (29), and (31) disposed between pre- and post-amplifiers (17) & (18), (19) & (20), among the plurality of segments, "between" the electro-optical converter (2) and the post amplifier (5) of the transmitter, "between" the multiplexer (21) and post-amplifier of the transmitter (Fig. 2), "between" pre-amplifier (9) and the opto-electric converter (11) of the receiver, and between pre- and post amplifiers in the receiver, ahead of the demultiplexer.

With regard to claims 6-8, 61, 62, 31- 32, 37 – 38, 40, 41, 44, 45, 50, 51, 56, and 57, Chraplyvy, et al anticipate that the dispersion shifted fiber is typically dispersion shifted for operation at 1.55μ (Col. 1, lines 14 – 18), that the conventional fiber segments will have a 1.3μ zero-dispersion wavelength (Col. 6, lines 16 – 18), and that the system will include a transmission wavelength of about 1.55μ (Col. 6, lines 10 – 20). This is clearly true at least in the WDM case, where eight channels are spaced 1.6 nm apart and centered at about a 1500 nm transmission wavelength.

With particular regard to claims 24 and 46, Chraplyvy, et al expressly disclose that the compensator (31) and amplifiers are part of the receiver (Col. 5, lines 15-17). Thus, it is believed that the illustration (Fig. 2) is in error.

Allowable Subject Matter

Claims 1 – 4, 15, 16, 25 – 28, 33 – 35, 47, 54, 59, and 60 are allowable over the prior art of record. The following is a statement of reasons for the indication of allowable subject matter:

The prior art, taken alone or in combination, fails to teach or to fairly suggest the combination of

an optical fiber transmission line composed of a plurality of segments each falling within a predetermined range, an optical amplifier between any two adjacent segments, an optical transmitter, an optical receiver, and a dispersion compensator, wherein the compensator is provided between front and rear stage amplifiers of either a transmitter as recited in claims 1, 15, 25, and 33 or the compensator is provided between front and rear stage amplifiers of a receiver, as recited in claims 16, 47, and 54, and in each case, particularly wherein the dispersion compensator provides a dispersion selected from a plurality of stepwise varying dispersions according to said predetermined range.

Response to Amendment

At the onset, the examiner wishes to thank Applicants' representative for the courtesies extended during the telephone interview conducted on 17 June 2002. Through Mr. Fields' earnest effort to advance prosecution, a number of errors in the last Office action were corrected without undue delay. The spirit of cooperation is noted with appreciation.

Applicants' argument regarding the rejection of claims 48 and 53 under 35 U.S.C. §102 (b) as being anticipated by Delavaux, et al have been fully considered, but are not found persuasive:

Delavaux, et al clearly disclose the embodiments of variable dispersion compensators in at least Figures 5 – 7, 9, and 10. It will be appreciated that the various switch means (111, 113, & 115, in Figs. 5 & 6); (71, in Fig. 7); (901; in Fig. 9); and (1001, in Fig. 10) provide for *stepwise* variation in the amount of compensation introduced. In one example, the *steps* are related as 1:2:4:8 (Col. 3, line 50 – 56).

It should then be recognized that the plurality of segments in the transmission line of Delavaux, et al *inherently* have lengths selected from a "predetermined" range. The range is determined in advance, according to the available gain, the loss budget, and the noise budget. Cooperation among these parameters is a necessary condition for an operative channel, that being the case, Delavaux, et al clearly convey the "predetermined" character of the segment lengths to one of ordinary skill in the art.

As to the relationship between the step compensator and the predetermined lengths, Delavaux, et al disclose that the compensator need not compensate *exactly* for actual dispersion. Nonetheless, Delavaux, et al clearly teach provision of compensation in steps which collectively suffice to compensate for dispersion encountered over the predetermined range of

segment lengths. Thus, Delavaux, et al anticipate the compensator itself with the specificity recited.

As to placement of the compensator, the examiner relies upon the pre-amplifier (5) as the recited "front-stage" amplifier, and fails to see a distinction between the two. Similarly, the relies upon amplifier (7) as the "rear-stage" amplifier, and fails to see a distinction between the two. The compensator is clearly disclosed as being placed between these units.

Accordingly, Delavaux, et al are believed to anticipate each of the limitations recited in claims 48 and 53, within the specificity recited.

Similarly with regard to the rejection of claims 48 and 53 under §102(b) as being anticipated by Ishikawa, et al (U.S. Patent number 5,602,666), Applicants' remarks have been fully considered, but are not found persuasive. Accordingly, the rejection stands as set forth above. Applicants remark that

"the pre- and post-amplifier in the dispersion compensator units 25 and 32 of Ishikawa is not the same as an optical amplifier having a front-stage amplifier and a rear-stage amplifier with a dispersion compensator being provided between the front-stage amplifier and the rear-stage amplifier" ,

but do not explain what the difference is, or where the differences are described in the claim. The first and second EDFA's of Ishikawa, et al are optical amplifiers, with a step-compensator situated therebetween. The examiner can discern no difference between the first EDFA and a "front-stage" amplifier, or between the second EDFA and a "rear-stage" amplifier. Accordingly, Ishikawa, et al are believed to anticipate each of the claimed elements, within the specificity recited.

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Applicant's remarks regarding the rejection of claims 5 - 8, 20 - 24, 29-32, 36 – 46, 49 - 52, 55 – 58, 61, and 62 under §102(b) as being anticipated by Chraplyvy, et al have been fully considered, but are not found persuasive. Chraplyvy, et al fairly teach that the dispersion shifted fiber can be located anywhere in the system. Thus, one of ordinary skill would have understood this to mean in place of any of the spans. For example, Chraplyvy, et al teach that in a concatenated system, fiber span 4 connects directly to the transmitter amplifier (3) at one end, and to an external amplifier (5) at the other end (Col. 4, line 55). It will be appreciated that in such Chraplyvy, et al teach that the other fiber spans are not spooled (as in the dispersion-averaged system), and thus are not properly regarded as a "dispersion compensator", *per sé*. Similarly remarks apply to the other species of compensator placement.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Henmi, et al (U.S. Patent RE37,621 E) disclose an optical path comprising segments of dispersion shifted fiber and dispersion compensating fiber.

Akiba, et al (U.S. Patent number 5,966,228) disclose an optical path comprising segments of dispersion shifted fiber and dispersion compensating fibers in a system with dispersion compensation provided between two optical amplifiers.

Wildeman (U.S. Patent number 5,778,128) disclose an optical path comprising segments of single mode fiber and dispersion shifted fiber.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Juba whose telephone number is (703) 308-4812. The examiner can normally be reached on Mon.-Fri. 9 - 5.

The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

John Juba

Examiner, GAU 2872

November 20, 2002